

The opinion in support of the decision being entered today was **not** written
for publication and is **not** binding precedent of the Board.

Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BERNARD PFALZGRAF

Appeal No. 2002-2329
Application No. 09/647,815

ON BRIEF

Before ABRAMS, NASE, and BAHR, Administrative Patent Judges.
ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-12
and 14, which are all of the claims pending in this application.

We REVERSE.

BACKGROUND

The appellant's invention relates to a method of operating an internal combustion engine. An understanding of the invention can be derived from a reading of exemplary claim 1, which has been reproduced below.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Nakase <u>et al.</u> (Nakase)	4,199,938	Apr. 29, 1980
Takeshima <u>et al.</u> (Takeshima)	5,473,890	Dec. 12, 1995
Sultan	5,706,652	Jan. 13, 1998
Cullen <u>et al.</u> (Cullen)	5,722,236	Mar. 3, 1998
Deeba <u>et al.</u> (Deeba)	6,105,365	Aug. 22, 2000

The following rejections stand under 35 U.S.C. § 103(a):

- (1) Claims 1, 2, 10 and 14 on the basis of Cullen in view of Takeshima.
- (2) Claims 3, 4 and 6 on the basis of Cullen in view of Takeshima and Sultan.
- (3) Claim 5 on the basis of Cullen in view of Takeshima, Sultan and “design choice.”
- (4) Claims 7 and 8 on the basis of Cullen in view of Takeshima, Sultan and “design choice.”
- (5) Claim 9 on the basis of Cullen in view of Takeshima, Sultan and Deeba.
- (6) Claims 11 and 12 on the basis of Cullen in view of Takeshima and Nakase.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellant regarding the above-noted rejections, we make reference to the Answer (Paper No. 16) for the examiner's complete reasoning in support of the rejections, and

to the Brief (Paper No. 15) and Reply Brief (Paper No. 17) for the appellant's arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by the appellant and the examiner. As a consequence of our review, we make the determinations which follow.

The appellant explains in the specification that a disadvantage of modern catalytic converters is that their NOx storage capacity decreases over time as a result of sulfur deposits. The appellant's invention is directed to a process for operating an internal combustion engine in such a manner as to remove SOx from a conventional NOx storage catalytic converter. The invention is expressed in claim 1 in the following manner:

1. A method of operating an internal combustion engine having a NOx storage catalytic converter, including:

e) setting the requirement of desulfurization of the Nox storage catalytic converter;

f) operating the internal combustion engine at $\lambda_1 < 1$ and injecting secondary air upstream from the NOx storage catalytic converter during a first time period;

g) operating the internal combustion engine at $\lambda_2 < 1$, where λ_2 is larger than λ_1 , and discontinuing the injection of secondary air during a second time period following the first time period; and

h)¹ resuming normal operation of the internal combustion engine.

As explained on pages 9 and 10 of the specification and page 9 of the Brief, when the need for desulfurization is determined, the engine is operated rich ($\lambda_1 < 1$) and secondary air is added upstream of the catalytic converter, which causes the mixture to become lean ($\lambda > 1$) and has the effect of substantially raising the exhaust gas temperature.

When the exhaust gas temperature reaches a maximum allowable level, the secondary air is discontinued, whereupon the fuel/air mixture is set to $\lambda_2 < 1$, with λ_2 then being greater than λ_1 .

The examiner has rejected this claim under 35 U.S.C. § 103 as being obvious² in view of the combined teachings of Cullen and Takeshima. In arriving at this conclusion, the examiner has found that all of the subject matter recited in the claim is disclosed by Cullen except that Cullen fails to disclose λ_2 larger than λ_1 during the corresponding step of the method (see column 1, lines 37-44). However, it is the examiner's position

¹These subparagraphs should be designated as a), b), c) and d). The same error appears in claim 14.

²The test for obviousness is what the combined teachings of the prior art would have suggested to one of ordinary skill in the art. See, for example, In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). In establishing a prima facie case of obviousness, it is incumbent upon the examiner to provide a reason why one of ordinary skill in the art would have been led to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. See Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Int. 1985). To this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from the appellant's disclosure. See, for example, Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1052, 5 USPQ2d 1434, 1439 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988).

that it would have been obvious to one of ordinary skill in the art to modify Cullen to meet the terms of claim 1 in view of the teachings of Takeshima. In this regard, the appellant first points out that the Takeshima is different than that of Cullen in that Takeshima utilizes an SOx absorbent upstream of an NOx absorbent to keep the latter from accumulating SOx therein. The appellant goes on to argue that Takeshima discloses purging the SOx from the SOx absorbent and the NOx from the NOx absorbent at normal operating temperatures (see column 1, line 60 - column 2, line 14) without injecting air into the exhaust stream, and there is no teaching in either reference that the use of the two operating parameters (λ_1 and λ_2) disclosed in Takeshima for SOx removal at normal operating temperatures will also work for high temperature purging of SOx from a NOx storage catalytic converter.

For the reasons expressed in the Brief and the Reply Brief, we agree with the appellant that the examiner's rejection should not be sustained. Takeshima provides two separate absorbing traps, one for removing NOx and a second, upstream of the first, for removing SOx. Even if one acknowledges that Takeshima operates the engine during a particular time period so as to produce an $\lambda_2 < 1$ but greater than λ_1 to purge the SOx from the SOx trap at normal operating temperatures, there is no evidence to support the examiner's position that it would have been obvious to add such a feature to the Cullen system, which has only the single NOx converter and which teaches purging the SOx from a NOx converter at an elevated temperature. We are not

persuaded otherwise by the examiner's opinion on page 13 and 14 of the Answer, which is unsupported by evidence, that the SOx and NOx absorbents should be considered to be functional equivalents, and thereby it would have been obvious to one of ordinary skill in the art to install a feature that works to remove SOx from the Takeshima SOx absorber in the Cullen system to remove SOx from a NOx absorber.

It is our opinion that Cullen and Takeshima fail to establish a prima facie case of obviousness with regard to the subject matter recited in claim 1, and we will not sustain the rejection of claim 1 or of claims 2 and 10, which depend therefrom.

We reach the same conclusion, for the same reasons, with respect to independent apparatus claim 14, which provides control means that operate the engine with the same relationship between λ_1 and λ_2 during the second time interval.

Claims 3, 4 and 6, which depend from claim 1, stand rejected on the basis of Cullen and Takeshima, taken further with Sultan, applied for its teachings regarding temperature sensors. However, Sultan fails to alleviate the deficiency present in combining the teachings of the other two references, and we will not sustain this rejection.

Claim 5 depends from claim 1 through claims 3 or 4, and specifies 600°C as the minimum desulfurization temperature and 100°C as the minimum value added thereto. This claim has been rejected on the basis of the two references combined against claim 1, further considering that the selection of these temperatures would have been matters

of obvious “design choice” by one of ordinary skill in the art. Be that as it may, the addition of “design choice” with regard to the selection of temperature values does not overcome the problem discussed above in the context of the rejection of claim 1 regarding the teachings that can be attributed to Cullen and Takeshima. The rejection of claim 5 is not sustained.

For the same reason, we will not sustain the rejection of claims 7 and 8, both of which depend from claim 1, as being unpatentable over Cullen, Takeshima, and the obvious “design choice” of selecting the specific values for λ_1 and λ_2 that are set forth in these claims.

The addition of Deeba to Cullen, Takeshima and Sultan in rejecting dependent claim 9 does not alter our conclusion that Cullen and Takeshima do not render claim 1 obvious, and we will not sustain this rejection.

Nor will we sustain the rejection of dependent claims 11 and 12 on the basis of the references applied against claim 1 taken further with Nakase, which does not alleviate the problem with the two main references.

CONCLUSION

None of the rejections are sustained.

The decision of the examiner is reversed.

No time period for taking any subsequent action in connection with this appeal
may be extended under 37 CFR § 1.136(a).

REVERSED

NEAL E. ABRAMS
Administrative Patent Judge

JEFFREY V. NASE
Administrative Patent Judge

JENNIFER D. BAHR
Administrative Patent Judge

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